REMARKS

Claims 1, 3, 5, 10 and 12 are presented for examination with claim 1 being currently amended, claims 3, 5, 10 and 12 pending as originally filed and claims 2, 4, 6-9, 11 and 13-14 canceled without disclaimer or prejudice.

Claim 1 has been amended to incorporate the limitations of claim 2. No new matter within the meaning of § 132 has been added by the amendments.

Drawing objections

The Office Action objected to the Drawings because reference characters "1-3" are used to designate both the synthesis steps in Fig. 1 and the X-ray diffraction patterns in Fig. 2. Citing CFR § 1.84(p)(4).

However, the objection is traversed because the reference characters "1-3" in the Fig.1 and Fig. 2 do not relate to the same part of an invention. Rule § 1.84(p)(4) states that "[t]he same part of an invention appearing in more than one view of the drawing must always be designated by the same reference character, and the same reference character must never be used to designate different parts." In this case, Fig. 1 shows the synthesis process of the solid acid catalyst while Fig. 2 shows the powder X-ray diffraction spectrum of lamellar metal oxide. They do not relate to the same part of the invention, and therefore the proscription against the same reference character being used to designate different parts, does not apply. Interestingly, the Office Action even admits this point by stating "both (1) steps of the synthesis process in Figure 1 and (2) X-ray diffraction patterns for the examples of the lamellar metal oxide". See Office Action at page 2, ¶ 4.

In view of the clear misapplication of the rule, the objection is requested withdrawn.

35 U.S.C. § 103 rejections

(1) Yoshida et al. in view of Takagaki et al.

The Office Action rejected claims 1-14 as being unpatentable over "Shinjiki-2-jigen . . .", CSJ, March 11, 2002 ("Yoshida *et al.*") **or** "Titanium Niobate . . .", Dai 90 Kai September 10, 2002 ("Takagaki *et al.*"). From the context of the rejection, it appears the rejection is over Yoshida *et al.* **in view of** Takagaki *et al.*, and not Yoshida *et al.* **or** Takagaki *et al.*, and will be treated as such. The Office Action alleged that while Yoshida *et al.* only teaches a Ti/Nb ratio of z of 1 and Takagaki *et al.* teaches a ratio z of 0.818, both of which are not within the claimed range of $1<z<1.5$, a person of ordinary skill in the art would nevertheless have been motivated to experiment and make the range. The Office Action also alleged that changes in catalytic activity associated with changes in atomic ratios are known design parameters.

This is incorrect. The references do not provide any suggestion or motivation to make the presently claimed limitation of "a Ti/Nb atomic ratio z of $1<z<1.4$". Also, the ratio of Ti/Nb, which is not an integer ($1<z$), as presently claimed, was not previously known to be a design parameter, nor would one of ordinary skill in the art be motivated to make the non-integer Ti/Nb ratio over any other atomic ratio in $HTi_xNb_yO_5$ such as Ti/H, Ti/O, Nb/H, H/Ti, H/Nb, H/O, O/Ti, O/Nb. The claimed solid catalyst of independent claim 1 is unexpectedly superior and rebuts an allegation of obviousness. Fig. 3 of the specification shows the relationship between catalyst activity and the Ti/Nb ratio when used as an ester dehydration condensation catalyst. The graph shows that for the

claimed range of a Ti/Nb atomic ratio z of $1<z<1.4$, that the amount of ethyl acetate formed by 6 hours reaction time/mol is unexpectedly a function of the claimed ratio Ti/Nb in the claimed range of $1<z<1.4$, and results in improved yields.

However, the cited references fail to provide any suggestion or motivation that optimization of the Ti/Nb ratio in the claimed range gives rise to improved yields. In fact, Takagaki *et al.* tends to teach away from the claimed range of $1<z<1.4$ by suggesting that a ratio of Ti/Nb = 0.818, which is below the lower limit of the claimed range of 1 yields higher activity. See Takagaki *et al.* at Sec. 3. The reference teaches that a catalyst composition of $H_{0.9}Ti_{0.9}Nb_{1.1}O_5$, where the Ti/Nb ratio is 0.818 has higher activity than the original composition (Ti/Nb=1). One of ordinary skill in the art clearly would not have been motivated to make the claimed $1<z<1.4$ range based on this teaching. Similarly, Yoshida *et al.* teaches a Ti/Nb ratio of 2 for HTi_2NbO_7 as having strong activity. Again, this is well outside the claimed upper limit of the claimed range of 1.4, and would lead an ordinary researcher to experiment away. The teaching might not even be sufficient to provide conclusions insofar as Oxygen is 7, and not 5, in the Yoshida *et al.* composition.

The unexpected and superior advantages of the claimed range clearly rebuts any allegation of *prima facie* obviousness, because it is only through applicants' inventive efforts and skill that the claimed ratio in the range of $1<z<1.4$ was found to unexpectedly improve the amount of ethyl acetate formed. As the court stated in In re Corkill, "a greater than expected result is an evidentiary factor pertinent to the legal conclusion of [non]obviousness". 266 USPQ 1005 (Fed. Cir. 1985).

(2) Yoshida et al. or Takagaki et al. in view of Hara et al.

The Office Action rejected claims 3-14 as being unpatentable over Yoshida *et al.* or Takagaki *et al.* in view of "Koteisan . . .", Shokubai, June 10, 2002, Vo. 44, No. 4 ("Hara *et al.*").

Insofar as pending claims 3, 5, 10 and 12 depend on, or contain the limitations of claim 1, the same argument over the rejection set forth in section (1) of this paper applies. It is emphasized that one of ordinary skill in the art could not make the claimed Ti/Nb ratio from the cited references. Instead, the claimed invention was made for the first time by inventors by synthesizing many titanium niobate solid acid catalysts, investigating their activity, and unexpectedly making the claimed ratio. The non-integer Ti/Nb ratio is not a known design parameter that can be easily determined by limiting the ratio to a perceived optimum range, and the claimed range is clearly not mere optimization of known variables but the result of an effort to determine what ratios between what elements unexpectedly results in improved yields.

Conclusion

In light of the foregoing, it is submitted that the application is now in condition for allowance. It is therefore respectfully requested that the rejection(s) be withdrawn and the application passed to issue.

Respectfully submitted,
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